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Veröffentlichungsversion / Published Version
Zeitschriftenartikel / journal article

Empfohlene Zitierung / Suggested Citation:
Skupnik, C. (2014). EU enlargement and the race to the bottom of welfare states. *IZA Journal of Migration*, *3*, 1-21. https://doi.org/10.1186/s40176-014-0015-6

IZA Journal of Migration
a SpringerOpen Journal

ORIGINAL ARTICLE Open Access

EU enlargement and the race to the bottom of welfare states

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Abstract

After the introduction of the freedom of movement for Eastern European workers, EU-15 countries were expected to reduce public benefits in order to avoid becoming "welfare magnets". However, OECD data do not support the prediction of a race to the bottom in benefit levels. Using EU-LFS data, I analyze the determinants of migration flows and do not find evidence that welfare state variables affect migration flows when controlling for temporary political restrictions of the freedom of movement. This explains why the pressure to modify welfare spending is small. Furthermore, evidence is found that the restrictions offset the migration incentive effects of work-related pull factors.

JEL classification: F22, J21, J61

Keywords: Determinants of migration decisions; EU enlargement; "Welfare migration"; Push and pull factors

1 Introduction

In December 2002, the European Council voted in favor of enlarging the EU by an additional 10 countries. The decision was approved by the EU parliament in April 2003. On the 1st of May 2004, these 10 countries, mainly situated in Eastern Europe (EU-10)[1], joined the Union. On the 1st of January 2007, Bulgaria and Romania (EU-2) followed. A central institutional change connected to the acceptance of the new member states in the European "club" was the introduction of the freedom of movement for workers. According to this legislation, every citizen in the EU can start working in another EU country without the need for a work permit. For potential migrant workers, this regulation significantly reduces the cost of moving abroad.

Within a common labor market, the size and composition of migration flows are not determined by the decisions of local immigration officers, but by the aggregate of individual migration decisions in the source regions. Thus, national governments partly delegate their sovereignty of determining the size and composition of the population to millions of potential migrant workers who can freely decide where to settle. Since the standard of living in the new member states was well below the average level in the old EU-15 member states[2] at the time the legislation was brought into force, the accession initiated a debate about the sustainability of the welfare state.

Sinn (2002) warned that the introduction of the freedom of movement for workers in combination with access to public benefits in the EU-15 would result in an erosion of protection levels. According to his reasoning, national governments could be expected to avoid inflows of migrants claiming welfare by reducing the generosity of benefits. A race to the bottom dynamic in the EU-15 could thus cause an erosive process. Kvist (2004) drew less drastic conclusions by arguing that the effects of "welfare migration" are too small to directly affect the decision-making process on the national level. However, he also considered that governments in the EU-15 might engage in strategic interactions with respect to decisions on national social policies.

Certainly also as a result of these political controversies, the so-called *2 + 3 + 2 rule* found its way into the accession treaties. This rule concedes EU member states the right to postpone the realization of the freedom of movement for workers for up to 7 years after the accession. It applies to workers from the EU-8[3] and the EU-2 member states. In summary, the option of applying the *2 + 3 + 2 rule* led to a very asymmetric opening of the labor markets in the EU-15 towards the East. Ultimately, national decision makers in EU-15 countries were endowed with two policy instruments to potentially influence the inflow of workers: the generosity of the welfare state and the postponement of the labor market opening through the *2 + 3 + 2 rule*. The main goal of this study is to analyze how these political decisions influence the migration flows to the EU-15. How relevant is the "welfare magnet" effect in the EU-15? How did the "welfare magnet" effect interact with the application of the *2 + 3 + 2 rule*? Did a race to the bottom in the generosity of welfare states take place?

In a first step, I present the strategic instruments of the national policy makers in a stylized way. I illustrate the development of the welfare state in the different EU member states in the aftermath of the 2002 decision in Copenhagen. Several indicators characterizing welfare state generosity like the ratio of social expenditures to the GDP level, the social expenditures per capita and the net replacement rate that defines the out-of-work benefit level are described. In addition, the asymmetric application of the *2 + 3 + 2 rule* in the different countries is discussed. Secondly, an analysis of the effects of the policies in the EU-15 member states on the immigration flows is pursued. Using micro data from the EU Labour Force Survey (EU-LFS), I estimate the effects of a rich set of determinants that influence the individual migration decision and thus the migrant inflow to a destination country in the EU-15.

A special focus is put on the "welfare magnet" effect since the significance and strength of this effect determines the magnitude of clustering in generous welfare states. The stronger the effect is the more intense should be the interaction of national governments in reducing social expenditures. As micro data from the EU-LFS are used, some light is shed on the effect of the composition of the diaspora and the source population on the migration flows. Information on socio-economic characteristics of the surveyed is included in the regressions which allows for a deeper analysis of the network relationship of the sending and receiving country.

The paper is structured as follows. Section 2 gives an overview of the literature on "welfare migration" and the effects of networks and institutional restrictions on individual migration decisions. In Section 3, I present some stylized facts about the potential race to the bottom dynamics in the EU-15 after the enlargement decision of Copenhagen in 2002. The development of the welfare state generosity and the asymmetric application of the

restrictions on the freedom of movement are shown and discussed as strategic instruments of national policy makers. Section 4 presents the data and a descriptive analysis of migration flows from the EU-10 and EU-2 member states. Section 5 is devoted to the empirical analysis of the determinants of migration flows using the EU-LFS and to the discussion of the major findings. Furthermore, I present results from a sensitivity analysis which includes alternative concepts of welfare state generosity and a comparison of the results with the previous findings. The last section concludes.

2 Literature review: "Welfare magnets" and the migration decision

The direction, size and composition of international migration flows are functions of the aggregate of millions of individual migration and remigration decisions. In turn, these decisions are determined by a rich variety of country- and individual-specific factors[4]. Zimmermann (1995) describes these individual choices as best answers to a complex system of push and pull factors. Initially, the discussion of welfare state generosity as a pull factor goes back to the Roy model (Roy, 1951) that is applied to the case of migration decisions by Borjas (1994)[5]. Based on this theoretical model, Borjas (1999) develops the "welfare magnet" hypothesis. It consists of two parts: (1) states with high levels of social security attract more migrants in general (better insurance of unemployment risks as a pull factor) and (2) immigrant flows to these states are characterized by an over-proportionately high share of low-skilled migrants (negative selection). The first part addresses the issue of selection across alternative destinations while the second addresses the selection within the immigration flows.

Borjas (1999) tests whether the hypothesis is supported by data on the patterns of immigration to US states. He finds empirical evidence that, relative to natives, benefit receiving immigrants to the US cluster in states where benefit levels are high. The native-immigrant gap is explained by the differences in migration costs.

However, several economists have challenged these findings. Kaushal (2005) does not find evidence that immigrants cluster in US states that are characterized by a high level of benefits. She shows that access to TANF, Medicaid and food stamps (means-tested programs) does not or only weakly change the location choice of low-skilled unmarried immigrant women. Since this is the group that is most likely to be dependent on welfare systems, she concludes that the "welfare magnet" hypothesis can be rejected. Other authors argue that clustering of migrants is more likely caused by migrant network effects than by the welfare levels. Beine et al. (2011) use data of bilateral migration flows from 195 source to 30 OECD destination countries and find that the size of diasporas in destination countries have a positive effect on immigrant inflows and an adverse effect on the education level of the immigrants. In contrast, the benefit level does not appear to have a significant effect on the location choice across the countries.

Pedersen et al. (2008) analyze flows from 126 countries to 26 OECD destination countries. Their results are in line with the findings of Beine et al. (2011). While Beine et al. (2011) have information on the education level of the surveyed and thus are able to directly test the effect of the welfare level on the skill composition of the flows, Pedersen et al. (2008) proxy the skill level by the GDP of the source country. The latter study finds weak evidence for a U-shaped relationship between the welfare level in the destination and the GDP per capita in the source. Migrants of relatively poor or of relatively rich countries in terms of GDP per capita are most attracted to destination countries with high benefit levels.

The authors further conclude that a restrictive migration policy often prevents the adverse selection of migrants.

Empirical studies with a cross-country focus on Europe are relatively scarce. De Giorgi and Pellizzari (2009) analyze panel data from the European Community Household Panel (ECHP) and find a significant effect of the net replacement income in the destination country on migration decisions. However, the effect is small compared to the incentive from a higher annual compensation of employees. In their study, a higher compensation has a 10 times larger effect on the likelihood of migrating to a destination than an increase in the net replacement income. Brücker et al. (2002) find support for the thesis that welfare generosity implies negative sorting of migrants in Europe. The study shows that high-skilled migrants prefer countries with low benefits and taxes, while the low-skilled cluster in countries with a high benefit level. Giulietti et al. (2013) focus on the correlation between unemployment benefit spending and immigration flows from EU and non-EU countries to 19 European countries. They only find a small correlation between benefit levels and immigration flows for non-EU migrants using OLS while the analysis with IV and GMM estimators gives evidence for a much smaller effect close to zero.

In a recent paper, Razin and Wahba (2011) provide an explanation why most empirical studies do not find evidence for the "welfare magnet" hypothesis. Introducing different migration regimes, they show why "welfare migration" should only prevail in common labor markets without mobility restrictions. It is argued that, for example, in the common EU labor market with free movement for workers the benefit level should act as a pull factor, while this need not be the case for countries with a migration regime that restricts the entry or the access to welfare for migrants.

To summarize the current state of research, two determinants besides the differences in the skill rewards should be named that "compete" for being the more important explanatory variables for migrant clustering: the network effect and the "welfare magnet". While some studies emphasize the clustering effect through networks (Beine et al., 2011; Kaushal, 2005; Pedersen et al., 2008), other authors point out the importance of the welfare level (Borjas, 1999; Brücker et al., 2002; De Giorgi and Pellizzari, 2009). However, these studies only partially control for the differential effect of migration regimes that might reduce or completely eliminate the marginal effects of the push and pull factors. A further weakness of most studies is the use of bilateral macro flow data that do not allow for the analysis of the composition of the diaspora and the population in the source region. Migrant stocks are treated as black boxes so that incentives due to socio-economic characteristics are to be ignored in the analysis.

3 Strategic interaction: Is there evidence for a race to the bottom?

According to the non-discrimination principle in the European treaties, every EU citizen can claim benefits in another EU member state after a short period of employment. Authors like Sinn (2002) and Kvist (2004) have thus warned that the EU enlargements in 2004 and 2007 might lead to a race to the bottom in welfare state protection. In a common EU labor market, a reform of national welfare institutions does not only affect the economic outcomes via the local labor market but may also affect the migration incentives for potential workers from other EU countries as the attractiveness of a destination country changes *ceteris paribus*.

Razin and Wahba (2011) emphasize that governments can reduce the pressure from potential "welfare migration" by introducing restrictions on labor mobility. In the case of the EU enlargements in 2004 and 2007, these restrictions are defined under the *2 + 3 + 2 rule*. The relevance of the pull effect of the welfare state generosity in an EU-15 member state thus depends on the level of the public benefits and the application of the *2 + 3 + 2 rule*. Both decisions at the national level potentially create policy externalities on other member states as migration flows to other destinations and their skill composition might be diverted as a result. But is there evidence for a race to the bottom after the decision in Copenhagen in 2002? Has the EU enlargement initiated strategic behavior between the different EU-15 countries?

Figure 1 below shows the development of the ratio of public social expenditures relative to the GDP level in the EU-15 member states after 2002. The year 2002 is chosen as a starting point since the decision to enlarge the EU took place in that year. Hence, potential adjustments of welfare states directly after the final enlargement decision are considered in the analysis. The measurement is normalized to 1 in each country for the reference year 2004.

The numbers are based on detailed OECD data for 2002 to 2009 and projections of the aggregated spending for the years 2010 to 2012. Cash benefits and benefits in kind are included. Data are collected from the OECD Social Expenditure Database (SOCX)[6]. For the countries in the South (Greece, Italy, Portugal and Spain), an upward trend in the relative importance of the social expenditures can be observed until 2009. From the year 2009 onwards, the ratios stay relatively constant despite the abolishment of restrictions towards workers from the EU-2 in Greece, Portugal and Spain. The ratios of Belgium, France and the Netherlands also show an upward trend during the portrayed

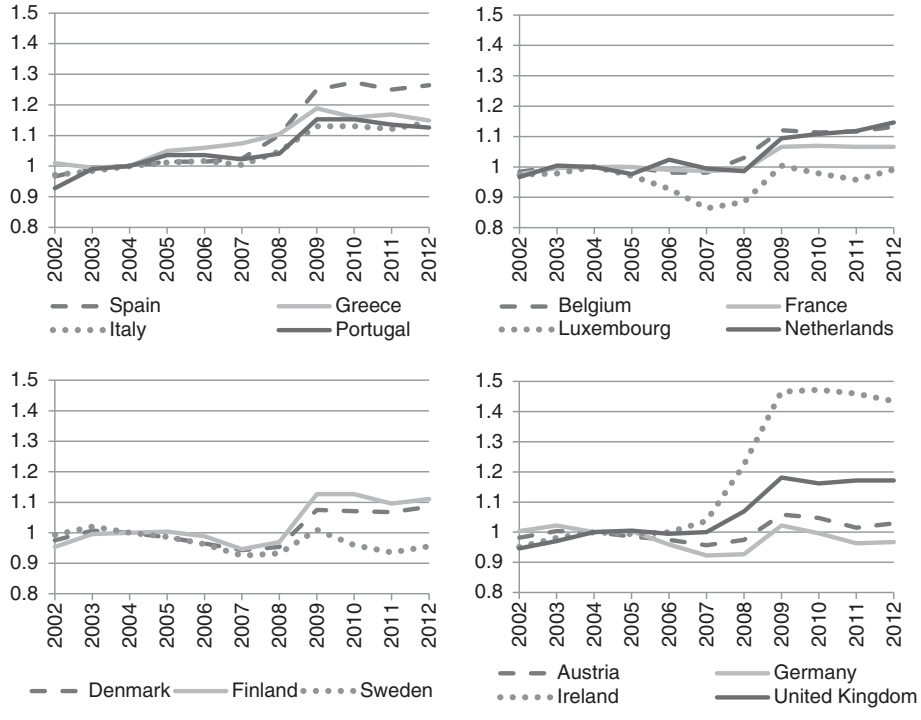

Figure 1 Ratio of public social expenditures to GDP in the EU-15 countries, 2002 - 2012.

period. In Luxembourg, the ratio declined from 2004 to 2007, but then returned back to the level of 2004 although the labor market restrictions for workers from the EU-8 were lifted in 2007.

Denmark, Finland and Sweden are characterized by weak declines in the relative expenditures until 2007. However, in Denmark and Finland, these declines are more than offset by increases in the measurement from 2007 to 2012. Only in Sweden, the ratio in 2012 stays below the value of 2004. For Austria and Germany, the development shows a stable pattern over time, the levels in 2012 are close to the levels reported in 2004. The numbers for Ireland and the UK indicate a tremendous increase. In Ireland, the ratio in 2012 is about 40% larger than in 2004. For the UK, an increase of about 20% is reported. Despite the opening of the borders for the workers from the EU-8 in 2004, no evidence for a relative decline in public social expenditures can be found in the two countries. In fact also data on public social expenditures per capita in purchasing power do not support the race to the bottom hypothesis. In Additional file 1: Figure 2A, the development of the purchasing power adjusted expenditures per capita is illustrated. It shows that in all EU-15 countries the expenditures per capita increased during the period from 2004 to 2009.

One might argue that relative or per capita measurements cannot account for increases in the number of recipients, for example, in the case of increasing unemployment rates. Obviously, numbers on the expenditures per recipient would be the most accurate measurement of the welfare state generosity. Unfortunately, data that are internationally comparable are not available. However, the OECD Benefits and Wages database provides internationally comparable information on the net replacement rate (NRR). This rate which measures the ratio of the replacement income in the case of unemployment relative to the average income of the worker before unemployment is presented in Additional file 1: Figure 1A. The development of the NRR does not indicate evidence for a dramatic decrease in the benefit levels across EU-15 countries. Besides the decision on the design of the welfare state, an EU-15 country had a second policy instrument for strategic interaction: the *2 + 3 + 2 rule*. In Additional file 1: Table 1A, the application of this rule from 2004 to 2011 is presented.

The findings of the descriptive analysis show that there is no clear evidence for a race to the bottom after the decision on EU accession in 2002. Social expenditures relative to GDP rather show an increasing trend until 2012 which might be explained by increasing unemployment rates that outweigh the effects of EU enlargement. This finding is supported by Gaston and Rajaguru (2013) who report a positive relationship between the ratio of social expenditures to GDP and the change in immigration relative to the native population. The development of the net replacement rate that determines the out-of-work benefits of an unemployed person also does not support the hypothesis of an erosion of welfare state protection driven by EU enlargement.

However, a central question remains unanswered: did the restrictions on the freedom of movement eliminate the pressure to reduce welfare levels or was the "welfare magnet" effect too weak to significantly influence policy making on the national level? This question is addressed in the following sections which are dedicated to the empirical analysis of the determinants of migration flows and their interaction with the migration regime in place.

4 Data and descriptives: Estimating migrant flows with the EU-LFS

4.1 The dataset

With the European Labour Force Survey (EU-LFS), Eurostat provides data from the national micro census surveys for all 27 EU member states containing information on demographic characteristics and the job situation of the surveyed. Due to the standardization of the questionnaire, the data are comparable and can be used for cross country comparisons. In spite of the comparability across countries, the EU-LFS dataset and household survey data in general are still seldom used for the estimation of international migration flows (Rendall et al., 2003). It is argued that the estimates are often imprecise due to several problems regarding the representation of migrants in survey data. Rendall et al. (2003) come to the conclusion that, on average, the LFS underestimates the size of the migration flows by around 15 to 25 per cent compared to data from the UK's port survey, the International Passenger Survey and the UK censuses.

Martí and Ródenas (2007) confirm these results. In their study, a comparison of official register and census statistics with the estimations based on the EU-LFS is conducted. With respect to migrant stock estimates based on the self-reported nationality, Martí and Ródenas (2007) report that the EU-LFS numbers coincide with the official statistics from immigration registers or censuses in most EU-15 countries. Only for Greece and Spain do numbers show significant divergences[7]. Other examples for studies on immigration based on information from the LFS are Blanchflower and Shadforth (2009), Drinkwater et al. (2009) and Dustmann et al. (2010). After the discussion of the weaknesses of the data, Dustmann et al. (2010) who use the UK LFS emphasize that "despite these limitations, the LFS remains the best available source of data on immigrant stocks […]" (p. 7). Relying on data from the same source, Longhi and Rokicka (2012) expect the survey to offer a precise picture of the immigrants that live in the UK including the self-employed.

To my knowledge, there is no analysis of determinants of migration flows across EU countries based on EU-LFS data. Beine et al. (2011) take cross section data on two years (1990 and 2000) from the Docquier and Marfouk (2006) database. Changes affecting migration incentives and flows in the 10-year-period between 1990 and 2000 cannot be considered. Pedersen et al. (2008) also use data from 1990 and 2000 from statistical offices of 26 OECD countries. Consequently, the same problem as in Beine et al. (2011) applies. De Giorgi and Pellizzari (2009) use micro data from the European Community Household Panel (ECHP). The authors can thus control for the effects of the socio-economic background of the immigrants. However, the study suffers from possible imprecision due to small sample sizes as the samples of the ECHP are considerably smaller than samples of the micro census. The reasons why I use EU-LFS data are the availability of socio-economic information and the large number of observations.

4.2 Migrant stocks in EU-15 countries after 2004

In this study, information on self-reported nationality in the EU-LFS dataset is used to measure the immigrant stock in an EU-15 destination country. This procedure has two advantages over the alternative country of birth principle: 1) nationality defines an immigrant's status in official statistics of most EU member states and 2) the institutional restrictions on the freedom of movement (*2 + 3 + 2 rule*) which are applied on the basis of the worker's nationality can be considered in the empirical analysis.

Unfortunately, information on the origin of the surveyed are highly aggregated in the scientific use files. For the years 2004 to 2011, the self-reported EU nationalities are subsumed in three country groups: EU-15, EU-10 and EU-2. Since, before 2004, data on nationality are even less precise[8], the analysis exclusively relies on EU-LFS data from 2004 to 2011.

Denmark, Finland and Sweden group EU-10 and EU-2 nationalities under the single category EU-12. As this does not allow for the consideration of differential effects through the *2 + 3 + 2 rule*, these countries are excluded from the analysis. All three countries are characterized by high levels of welfare state protection relative to the other EU-15 countries so that excluding them might bias the estimation of the "welfare magnet" effect. However, the number of EU migrants that moved to these three destinations after 2004 is relatively small (Holland et al., 2011). Hence, the regression coefficients of the "welfare magnet" effect should overestimate the true impact of the public benefits when these countries are excluded. They should thus represent an upper bound of the effect in reality.

In Additional file 1: Figure 3A, the development of the EU-10 migrant stocks in the EU-15 countries is presented. It shows that the increases were modest in most countries. Nonetheless, some countries experienced larger inflows than expected before accession. In Germany and the UK, the number of EU-10 nationals increased significantly from 2004 to 2011. Ireland also experienced large inflows. The stock of migrants from the EU-10 countries expanded from about 59,000 persons in 2005 to about 180,000 in 2011. In the other EU-15 countries, the increases are less pronounced in absolute terms.

Additional file 1: Figure 4A illustrates that migration from the EU-2 to the EU-15 countries followed a different pattern. The flows were concentrated on Italy and Spain. In Italy, the number of EU-2 nationals increased from about 350,000 persons in 2005 to over 1,000,000 persons in 2011. Spain experienced an increase from around 300,000 (2004) to around 870,000 persons (2011). EU-LFS data for the other countries report a much smaller increase in the size of the stocks.

5 Empirical analysis

The aim of the following empirical analysis is to quantify (1) the effect of different levels of welfare state protection and (2) the effect of the *2 + 3 + 2 rule* on the annual migration flows into an EU-15 destination country. Besides these two policy instruments of decision makers in the destination countries, I control for a rich variety of other economic and non-economic determinants ("endogenous controls")[9].

5.1 Constructing age-specific diaspora ratios

As dependent variable for the regression analysis, I define ratios of the total number of migrants in an EU-15 country relative to the number of persons in the source country group (EU-15, EU-10 and EU-2)[10]. In the following, I will refer to these ratios as diaspora ratios since they represent the proportion of nationals that live in the diaspora relative to the persons that did not leave the source country. The micro structure of the dataset allows for a further distinction of these ratios with respect to the age of the migrants. I therefore construct three age groups: the 15-24 year old, the 25-34 year old and the 35-44 year old persons.

This approach is the result of a careful analysis of the age-specific numbers of migrants estimated with the EU-LFS dataset. The annual changes of the migrant stocks characterized by an age larger than 44 years are extremely small in the considered EU-15 countries. This proves the irrelevance of the migrant flows in these age groups for the empirical analysis. The observation that geographic mobility decreases with the aging of an individual can be explained with the human capital theory. Arguably, gains from migration are largest for young migrants as this group profits the most from a higher remuneration of human capital over the life time. Thus, at a certain age, a move abroad is not advantageous anymore as the fixed costs of migration exceed the expected gains from a larger compensation of the human capital in an alternative location.

Unfortunately, I cannot identify whether a 15-24 year old individual is a student. In this case, the restrictions of the freedom of movement for workers do not apply. Hence, the regression results might be slightly biased. However, since many students also consider staying in the destination country for work reasons after finishing their studies the *2 + 3 + 2 rule* also has relevance for this group of migrants. The potential bias of not considering student status should thus not be overestimated in its significance.

The advantage of including migrants from other EU-15 countries is that it increases the number of country panel observations for the final analysis and, hence, its accuracy. There is no reason to expect that the behavior of EU-15 migrants systematically differs from the behavior of migrants from the countries that joined the EU after 2004. The fact that EU-15 migrants are not affected by any restrictions of the freedom of movement between 2004 and 2011 is considered by the inclusion of a migration regime dummy variable. In the case of EU-15 migrants, this dummy takes the value of 0 to indicate unrestricted freedom of movement within the whole EU.

As I consider three source country groups (EU-15, EU-10, EU-2) and three age groups, nine cohorts are built per year and destination country. Using weights provided by Eurostat, I then calculate the size of these nine diaspora cohorts and the size of the respective nine source cohorts. Finally, I build the diaspora ratios as the proportion of the size of the diaspora cohort to the size of the source cohort. Theoretically, for each destination country, 72 ratios could be constructed for the eight years from 2004 to 2011. In fact, the number of ratios considered in the analysis is smaller than 72 per destination since some countries do not deliver LFS data for each of the years under observation[11].

5.2. Identification strategy

Two approaches for estimating the determinants of migration flows dominate the literature: the dynamic stock model and the static flow model[12]. I estimate parameters for both model approaches. However, in the case of the dynamic stock model, the estimations indicate a dynamically instable model so that I reject the validity of the approach[13]. Hence, only the results of the static flow model are presented and interpreted in the following sections. The model is based on the assumption that migrants choose the destination country that maximizes their utility. This utility and thus the migration decision is determined by many different factors, be they destination country-, source country- or individual-specific. In the following, j denotes the 12 EU-15 destination countries ($j = 1,\ldots,12$), i the source cohort ($i = 1,\ldots,9$) and t the time period ($t = 1,\ldots,8$, from 2004 to 2011). The identification strategy is given by equation (1) which is estimated by using pooled OLS:

$$\Delta m_{ij,t} = \alpha_0 + \beta_1 D_{j,t\text{-}1} + \beta_2 N_{ij,\,t\text{-}1} + \beta_3 S_{i,t\text{-}1} + \beta_4 I_{ij,t\text{-}1} + \beta_5 T_t + \beta_6 c_i + \varepsilon_{ij,t} \quad (1)$$

Like in Pedersen et al. (2008), the dependent variable $\Delta m_{ij,t}$ denotes the annual change in the diaspora ratio. It describes a net change since the remigration decision is considered. Applying this definition has an advantage over the analysis of gross changes. It accounts for the fact that, for example, a change of the net wage in a destination country does not only affect the gross inflow of migrants, but at the same time has an effect on the remigration from the diaspora. Without death and naturalization, the change in the diaspora ratio measures the annual net emigration of the selected group from the source.

A challenge of analyzing determinants of migration flows is defining a strategy that is robust to possible estimation biases through reverse causality. An increase in the nominal net wage level might deliver a good explanation for an increase in the migrant stock as the destination country becomes more attractive due to the improved employment conditions. However, there might be an alternative, reverse explanation: migrants bring capital into the destination country and thereby increase the nation-wide capital to labor ratio. The increase in the compensation of human capital might thus be the result of the immigrant inflow rather than the cause of it. In order to address these possible endogeneity issues through reverse causality, I regress the current change rate in the diaspora ratio on explanatory variables that are lagged by one period. This procedure does not guarantee strict exogeneity, but it assures predeterminancy of the regressors (Mayda, 2010).

$D_{j,t\text{-}1}$ is a vector that consists of the destination country-specific factors influencing the migration and remigration decision. It contains the annual nominal net wage in 10,000 Euro, the unemployment rate in % and the size of the population in million persons in the destination. In addition, a Southern European country dummy which takes the value 1 if the destination country is located in Southern Europe[14] and a migration regime dummy which takes the value 1 if the freedom of movement for workers is restricted according to the *2 + 3 + 2 rule* are included. Last but not least, the ratio of the public social expenditures to the GDP level in the destination countries is added as a measurement for the generosity of the welfare state. $N_{ij,t\text{-}1}$ consists of the source-destination-specific network effects. It does not only account for the size of the diaspora (number of persons in million) in the destination, but also for its composition as it includes the average education level, the proportion of females and the employment rate in the diaspora cohort as regressors. $S_{i,t\text{-}1}$ represents a vector describing the socio-economic characteristics of the source population. It includes two variables, the average education level and the proportion of employed persons in the source cohort[15].

The education level is measured based on the International Standard Classification of Education (ISCED). In order to facilitate the comparison and in line with the literature[16], the educational achievements are categorized in three groups (low, medium and high) taking the values 1, 2 and 3. The low education group comprises of the ISCED levels 0 to 2 (early childhood education to lower secondary education). The medium level covers the ISCED levels 3 to 4 (upper secondary education to short-cycle tertiary education) while the high education level subsumes the ISCED levels 5 and 6 (bachelor or equivalent to doctoral or equivalent). These education variables are constructed as simple averages over the three categories taking the values 1, 2 or 3. With respect to the source countries, the education level is calculated over all individuals living in the EU-10 countries or EU-2

countries. For example, the education variable for the 15-24 year old EU-2 source cohort denotes the average education level of the 15-24 year old Bulgarians and Romanians together. The same logic applies to the calculation of the proportion of employed persons in the source.

Finally, $I_{ij,t\text{-}1}$ contains interaction effects of all push and pull factors ($D_{j,t\text{-}1}$, $N_{ij,t\text{-}1}$, $S_{i,t\text{-}1}$) with the migration regime dummy (*2 + 3 + 2 rule*) for the destination country. By including this vector, the differential effects of the migration determinants under the temporary restriction of the freedom of movement are controlled for. c_i is a source cohort fixed effect. It controls for unobserved heterogeneity of the age groups in the different groups of source countries. Further, in all regressions, time dummies for each period are included, which are represented by the vector T_t.

In contrast to, for example, Pedersen et al. (2008), I do not include destination (c_j) or destination-source pair (c_{ij}) fixed effects. The destination country fixed effects would "eat up" the effect of the observed destination country-specific pull factors that do not show considerable variation over time (for example, the country's ratio of social expenditures to GDP). The error term $\varepsilon_{ij,t}$ is assumed to be normally distributed and clustered over time periods and destination countries. The clustering problem is addressed by the estimation of cluster robust standard errors. I apply the STATA routine provided by Cameron et al. (2011) that accounts for non-nested two-way clustering in error terms[17].

5.3. Regression results

Table 1 below shows the results of the pooled OLS regression analysis. I exclusively apply pooled OLS as estimation strategy and do not use traditional panel estimators like Random Effects (RE) or Fixed Effects (FE) estimators. In result, destination country or country pair fixed effects are not considered and, hence, unobserved heterogeneity across cohorts is not corrected for. This is explained by the fact that the most important variables of the analysis do not show strong variance over the time dimension. Applying panel estimators would eliminate the effect of the relatively constant variables over time. This phenomenon is explained in detail by Pedersen et al. (2008).

The number of cell entries in the country panel is reduced as some diaspora ratios are constructed based on less than 50 individual observations in the EU-LFS sample. These estimates are presumably biased and thus are excluded. After dropping the data points, on average, each diaspora cohort is constructed based on 466 individual observations in the EU-LFS sample. The number of constructed cohort observations is 432[18]. In the Additional file 1, I also present the regression results with diaspora ratios that are constructed based on at least 10 individual observations. Since the results of both estimations do not significantly differ, I expect the bias from the exclusion of ratios to be negligible.

In the first four specifications (1) - (4), I model the effect of the *2 + 3 + 2 rule* in a very simple manner by the inclusion of a dummy variable that takes the value 1 if the freedom of movement is restricted and the value 0 if not. In specification (5), the model structure becomes more sophisticated as, in addition, interaction effects of the migration regime dummy with the other push and pull factors are added. In the following interpretation, I first explain the results of specification (1) to (4) and then focus separately on the fifth specification.

As expected, the annual nominal net wage in 10,000 Euro positively affects the annual migration inflows to a destination. In specification (1) to (4), the coefficient is

Table 1 Static flow model estimates for 12 EU-15 destination countries and 9 source cohorts

Explanatory variables	Dependent variable: $\Delta m_{ij,t}$ = annual change in the diaspora ratio				
	(1)	(2)	(3)	(4)	(5)
Destination country variables $D_{j,t-1}$					
Annual nominal net wage in 10,000 Euro in *j*	1.792*** (0.347)	1.967*** (0.487)	1.992*** (0.563)	2.143*** (0.576)	4.508** (1.952)
Unemployment rate in % in *j*	-0.040 (0.043)	-0.072 (0.056)	-0.084 (0.082)	-0.082 (0.101)	-0.329*** (0.119)
Population in destination country *j* in mio. persons	0.017** (0.008)	0.003 (0.015)	0.006 (0.015)	0.003 (0.013)	0.029 (0.025)
Southern European country (0/1)	2.762*** (0.399)	3.317*** (0.681)	3.535*** (0.935)	3.948*** (0.939)	7.926*** (1.936)
Regime dummy (restricted freedom of m.) in *j* (0/1)	0.822 (0.729)	0.934 (0.782)	0.969 (0.789)	0.873 (1.146)	-10.436 (10.500)
Public social expenditures /GDP in *j*	2.322 (5.179)	4.988 (5.691)	9.493** (4.410)	12.829*** (4.855)	5.897 (10.227)
Source-destination (network) effects $N_{ij,t-1}$					
Diaspora stock in *j* in mio. persons		1.171 (0.949)	0.848 (1.047)	0.986 (0.920)	1.132 (3.055)
Education level (ISCED) in age-specific diaspora			0.660 (1.031)	1.120 (0.955)	3.890 (2.918)
Proportion of females in age-specific diaspora			-4.303* (2.543)	-5.050* (2.925	-2.731 (3.534)
Proportion of employed in age-specific diaspora			0.318 (2.571)	0.557 (2.645)	-2.855 (3.599)
Source specific factors $S_{i,t-1}$					
Education level (ISCED) in source cohort			3.579 (3.416)	1.001 (7.327)	-4.271 (5.739)
Proportion of employed in source cohort			-5.603 (8.846)	-19.142* (10.111)	-17.305** (8.650)
Interaction of push-pull factors and the migration regime $I_{ij,t-1}$ [a]					
Annual nominal net wage × regime dummy					-3.479* (2.004)
Unemployment rate × regime dummy					0.438** (0.194)
Public social expenditures/GDP x regime dummy					-5.147 (10.730)
Diaspora stock in *j* in mio. persons × regime dummy					-1.996 (4.239)
Proportion of employed in source × regime dummy					-5.890 (16.186)
Time dummies	Yes	Yes	Yes	Yes	Yes
Age and source dummies	Yes	Yes	Yes	No	No
Source cohort dummies	No	No	No	Yes	Yes
Constant included	Yes	Yes	Yes	Yes	Yes
R-squared	0.286	0.298	0.315	0.338	0.474
Number of observations	432	432	432	432	432

*p < 0.10, ** p < 0.05, *** p < 0.01. Standard errors that are clustered by destination country and time periods are shown in parentheses. I use the STATA routine by Cameron et al. (2011) to control for two-way clustered error terms. In all regressions, time dummies and a constant are included. [a]Further variables are included: see the Additional file 1 for a table with all covariates. All explanatory variables are lagged by one year except for the migration regime dummy.

significant at the 1% level and ranges between values of 1.792 and 2.143. The effect of the unemployment rate in % is less clear cut since the estimated coefficients are all insignificant at the 10% level. However, the negative signs are line with economic theory. Larger unemployment rates should imply smaller numbers of immigrant inflows. With respect to the employment opportunities, migrants seem to put more weight on the expected compensation of labor than on the unemployment likelihood approximated by the unemployment rate.

The size of the destination country measured by the population in million persons seems to have a positive effect on immigration. The value of the coefficients ranges from 0.003 to 0.017. However, the effect is only significant at the 5% level in specification (1). I further control for the attractiveness of a destination country in terms of the geographic position by including a dummy for the Southern European countries. The dummy takes the value 1 if the destination country is Greece, Italy, Portugal or Spain and 0 otherwise. Although this classification is arguably arbitrary, the significance of the estimated effects in all specifications at the 1% level gives strong support for the idea that destination countries in the South are endowed with unobserved factors that attract migrants. These might be non-economic factors like a mild climate or a high quality of life (Graves, 1980).

In specification (1) to (4), the restrictions of the freedom of movement are modeled with a dummy variable that takes the value 1 if a restriction is in place and 0 if not[19]. Surprisingly, the coefficients of the migration regime dummy show a positive sign in the first four specifications, but the standard errors indicate that the coefficients are not significantly different from 0. According to economic theory, the dummy should enter the equation with a negative sign as the introduction of a restriction on the free movement for workers increases migration costs and should, consequently, result in a decrease of the migration inflow. The regression results though give an indication for the need of a more sophisticated modeling of the restricted freedom of movement as suggested by Razin and Wahba (2011).

A potential "welfare magnet" effect is modeled by the inclusion of the ratio of public social expenditures to GDP as a covariate. While in (1) and (2), the level of social expenditures relative to the GDP does not have a statistically significant effect on the diaspora ratio, the coefficients in (3) and (4) have a positive sign and are significant at the 1% and 5% level, respectively. These results give an indication that the generosity of the welfare state measured by the ratio of public social expenditures to the GDP might represent a pull factor for potential migrants. Furthermore, it seems to be the case that the pull effect of the benefits cannot be identified if the socio-economic characteristics in the diaspora cohorts are not controlled for. After including these additional controls, the "welfare magnet" can be disentangled from the pull effects of the diaspora characteristics.

The vector $D_{j,t\text{-}1}$ that represents the destination specific pull factors is included in all regressions. In specification (1), the annual change in the diaspora ratio is exclusively regressed on these destination specific variables. Specification (2) differs from (1) as the size of the diaspora from the same group of source countries in million persons is added as a regressor. The inclusion weakly increases the explanatory power of the model to an R-squared value of 0.298. The coefficients of the diaspora stock effect are positive in (2) to (4), but the reported standard errors indicate insignificance of the effects. In contrast to the findings of Beine et al. (2011) and Pedersen et al. (2008) who

identify significant effects of the diaspora size on migration decisions in OECD countries, I do not find empirical support for the network effect in the EU-15.

In specification (3), the regression is enriched by the inclusion of further variables measuring the source-destination network effect. The average education level, the proportion of employed and the proportion of females in the diaspora cohorts are added. However, only the proportion of females has a negative, significant effect on the annual change of the diaspora ratio. This observation might be explained by migration patterns that reflect a traditional division in gender roles within families. If men tend to migrate before their wives due to job-related incentives, for instance, a small share of females in the diaspora corresponds to a large potential of female partners in the source. On the way to the "new equilibrium" which is characterized by female migration due to family reunification, the potential for further migration deteriorates. This phenomenon finds its expression in a decreasing effect of the proportion of females in the diaspora on the annual change rate in the diaspora ratio.

Furthermore, two source-specific factors are considered: the average education level and the proportion of employed in the source cohort. While no evidence is found that the average education level in the source has an impact on the dependent variable, the proportion of employed in the source cohort seems to negatively affect the annual change in the diaspora ratio. For specification (4), a significant negative effect with a coefficient value of -19.142 is reported. This is in line with the economic intuition. An increase in the employment rate of a source country has a positive effect on the employment opportunities of the workers. Hence, the incentive to emigrate for job reasons diminishes if the employment rate expands.

Finally, in specification (5), vector $I_{ij,t-1}$ is considered for the first time. This vector accounts for the recent findings by Razin and Wahba (2011). It contains interaction effects of the migration regime dummy with all push and pull factors. The explanatory power of the model increases to an R-squared value of 0.474 indicating a significant improvement of the identification strategy. The coefficient of the annual nominal net wage effect in the destination country has a value of 4.508 which is 2 to 3 times the size of the coefficients in (1) to (4). For the interaction effect of the wage variable with the *2 + 3 + 2 rule* dummy, a coefficient of -3.479 is reported. The application of the rule reduces the wage effect from 4.508 to 1.029 which leads to the conclusion that the restriction of the freedom of movement is binding with respect to the net wage as a pull factor. In addition, the direct effect of the migration regime dummy variable becomes negative even though the estimator is insignificant. It has a coefficient value of -10.436 which has a reducing effect on the constant.

The coefficient of the social expenditure variable decreases to a value of 5.897 and is not significant. This result stands in contrast to the findings of Razin and Wahba (2011) who argue that the "welfare magnet" effect should increase in size and significance when the differential effect of the migration regime is controlled for. The comparison of specification (3) and (4) in which the migration regime is controlled for solely by the inclusion of a dummy variable delivers interest insights. In these cases, the benefits seem to act as a pull factor. However, by modeling the effects of the restricted freedom of movement more realistically with interaction effects, the significance of the welfare state as pull factor disappears while the coefficient of the unemployment rate in the destination becomes significant. The integration of the

interaction effects further reveals the dominance of work over public benefit incentives.

For the interaction effect of the "welfare magnet" variable with the *2 + 3 + 2 rule* dummy, a coefficient value of -5.147 is found. A potential pull effect of the welfare state variable would be almost completely offset by the application of the *2 + 3 + 2 rule*. Since I find rather mixed evidence with respect to the "welfare magnet" effect, the next section is devoted to a sensitivity analysis with alternative measurements for the welfare state.

5.4. Alternative modeling of the welfare state

There are other measurements for the welfare state generosity that are applied in the literature. De Giorgi and Pellizzari (2009), for instance, calculate the net replacement income in purchasing power to model the "welfare magnet" effect. In the following section, I thus perform estimations with alternative measurements of the generosity of welfare states as robustness checks. In Table 2 below, I modify specification (5) shown in Table 1. The ratio of social expenditures to GDP is replaced by the net replacement rate in (6) and by the nominal replacement income in (7). The net replacement rate is calculated as the ratio of annual net earnings and out-of-work income for a single person without children (100% average wage) in each destination country while the nominal replacement income measured in 10,000 Euro is the annual out-of-work income for a single person without children earning 100% of the average wage. Housing benefits are included. Both measurements are provided by the OECD Statistics Out of Work Tax/Benefit.

In specification (7), the net wage effect is also relatively similar in size compared to the other setups. However, the estimator for the coefficient is only significant at the 10% level. The coefficient for the net replacement income has a value of 1.546, but is insignificant according to the calculated standard errors. One explanation for the low significance levels of both, the net wage and the net replacement income effect, might be a multi-collinearity phenomenon since the replacement income is per construction highly correlated with the nominal net wage.

5.5 Comparison of effects

The magnitude of the effects is difficult to evaluate since the dimensions of the explanatory variables differ. So how can we interpret the coefficients in order to draw conclusions about their relevance? In Table 3 below, I compare a selection of economic effects that seem to have a major impact on the migration flows in the EU-15. The effects are made comparable by presenting the change of the dependent variable after a change in the explanatory variable by 1 standard deviation of the mean. In the second column, the standardized measurement for a change in the explanatory variable is introduced. In column 3, the coefficients of the direct effect and of the interaction effect with the migration regime dummy are shown. Column 4 presents the change of the dependent variable for the free movement scenario after a standardized increase in the explanatory variable. Equivalently, in column 5, the changes of the dependent variable for the restricted movement scenario are summarized.

In specification (5), a standardized increase in a destination country's annual net wage (6,140 Euro) increases the annual change in the diaspora ratio by 2.768[20]. This translates into about 2.8 additional persons out of 1000 persons in the source migrating to

Table 2 Static flow model estimates with alternative measurements for the welfare state

Explanatory variables	Dependent variable: $\Delta m_{ij,t}$ = annual change in the diaspora ratio	
	(6)	(7)
Destination country variables $X_{j,t-1}$		
Annual nominal net wage in 10,000 Euro in *j*	5.108***	4.391*
	(1.610)	(2.467)
Unemployment rate in % in *j*	-0.401***	-0.420***
	(0.098)	(0.115)
Population in destination country *j* in mio. persons	0.038*	0.039**
	(0.020)	(0.019)
Southern European country (0/1)	9.272***	9.305***
	(1.722)	(1.704)
Regime dummy (restricted freedom of m.) in *j* (0/1)	-11.059	-9.450
	(7.794)	(8.401)
Net replacement rate in % in *j*	2.770	
	(4.860)	
Annual replacement income in 10,000 Euro in *j*		1.546
		(2.971)
Source-destination (network) effects $N_{ij,t-1}$		
Diaspora stock in *j* in mio. persons	0.508	0.710
	(2.842)	(2.844)
Education level (ISCED) in the age-specific diaspora	2.964	3.043
	(1.845)	(1.950)
Proportion of females in the age-specific diaspora	-1.532	-1.592
	(3.130)	(3.241)
Proportion of employed in the age-specific diaspora	-3.480	-3.716
	(4.150)	(4.055)
Source specific factors $S_{i,t-1}$		
Education level (ISCED) in the source cohort	-3.515	-3.584
	(4.237)	(4.327)
Proportion of employed in the source cohort	-18.296**	-18.679**
	(8.632)	(8.133)
Interaction of push-pull factors and the migration regime $I_{ij,t-1}$ [a]		
Annual nominal net wage x regime dummy	-4.129**	-3.200
	(1.606)	(2.531)
Unemployment rate x regime dummy	0.505***	0.537***
	(0.145)	(0.149)
Diaspora stock in *j* in mio. persons x regime dummy	-1.393	-1.595
	(3.860)	(3.891)
Net replacement rate x regime dummy	-2.668	
	(4.487)	
Annual replacement income x regime dummy		-1.925
		(2.852)
Proportion of unemployed in the source cohort x regime dummy	-4.262	-3.813
	(16.629)	(16.311)

Table 2 Static flow model estimates with alternative measurements for the welfare state *(Continued)*

Source cohort dummies	Yes	Yes
R-squared	0.475	0.475
Number of observations	432	432

*p < 0.10, **p < 0.05, ***p < 0.01. Standard errors that are clustered by destination country and time periods are shown in parentheses. I use the STATA routine provided by Cameron et al. (2011) to control for two-way clustered error terms. In all regressions, time dummies and a constant are included. [a]Further variables are included: see Additional file 1 for a table with all covariates. All explanatory variables are lagged by one year except for the migration regime dummy.

the destination per year. The effect is reduced to about 0.6 persons per 1000 if the freedom of movement is restricted[21]. Applying a restrictive migration regime thus has a differential effect of about 2.1 persons per 1000 persons in the source on the annual change in the diaspora ratio[22]. The effects of the unemployment rate in a destination country are less strong.

In specification (6) and (7), for the free movement scenario, a decrease in the dependent variable of about 1.2 is reported after an increase in the unemployment rate by 2.996 percentage points. In the restricted freedom of movement scenario, a slightly positive effect is found which is not extremely different from the expected maximum value of 0 (column 5). If the proportion of employed in a source cohort increases by 5.6 percentage points, the annual change in the diaspora ratio decreases by about 1 in the free movement scenario. The effects in the case of the restricted migration regime are insignificant. This might be an indicator that the push effects are not affected by the application of restrictions in a single destination while the pull effects are more or less exactly offset by the application of the *2 + 3 + 2 rule*.

Table 3 Comparison of the economic effects on migration flows in the EU-15

Explanatory variable	Δ of 1 standard dev. from mean of the expl. var.	Coefficients: Direct effect/ interaction effect	Δ diaspora ratio: no restriction	Δ diaspora ratio: with restriction	Differential effect of restriction
Annual nominal net wage in 10,000 Euro in destination	0.614 (6140 Euro)	(4) 2.143***/none	(4) 1.316	-	-
		(5) 4.508**/-3.479*	(5) 2.768	(5) 0.632	(5) 2.136
		(6) 5.108***/-4.129**	(6) 3.136	(6) 0.601	(6) 2.537
		(7) 4.391*/-3.200	(7) 2.696	(7) 0.731	(7) 1.965
Unemployment rate in the destination country	2.996 (2.996%-points)	(4) -0.082/none	(4) -0.246	-	-
		(5) -0.329***/0.438**	(5) -0.986	(5) 0.327	(5) -1.313
		(6) -0.401***/0.505***	(6) -1.201	(6) 0.312	(6) -1.513
		(7) -0.420***/0.537***	(7) -1.258	(7) 0.351	(7) -1.609
Proportion of employed in the source cohort	0.056 (5.6%-points)	(4) -19.142*/none	(4) -1.072	-	-
		(5) -17.305**/-5.890	(5) -0.969	(5) -1.299	(5) 0.330
		(6) -18.296**/-4.262	(6) -1.025	(6) -1.263	(6) 0.238
		(7) -18.679**/-3.813	(7) -1.046	(7) -1.260	(7) 0.214
Social expenditures/GDP in the destination country	0.033 (3.3%-points)	(4) 12.829***/none	(4) 0.423	-	-
		(5) 5.897/-5.147	(5) 0.195	(5) 0.025	(5) 0.170
Net replacement rate in % in the destination country	0.181 (18.1%-points)	(6) 2.770/-2.668	(6) 0.501	(6) -0.018	(6) 0.519
Annual replacement income in 10,000 Euro in destination	0.580 (5800 Euro)	(7) 1.546/-1.925	(7) 0.897	(7) -0.220	(7) 1.117

*p < 0.10, **p < 0.05, ***p < 0.01.

In specification (4), an increase in the ratio of the social expenditures to the GDP level by 3.3 percentage points results in an increase in the dependent variable of 0.423. This much larger effect than in (5) is significant at the 1% level. However, with respect to the magnitude, it is still of minor importance. The effect of both the nominal net wage in a destination and the proportion of employed in the source cohort, is twice to three times as large as the "welfare magnet" effect. For specification (5), a hypothetical change in the dependent variable of 0.195 is reported for the free movement scenario and almost no effect for the restricted movement regime (column 5). Though, the estimated coefficients are statistically insignificant.

As result of the comparison, the following findings should be emphasized. First, the net wage in a destination country exerts a much larger positive effect on the migrant inflows than the public social expenditures. The coefficients in specification (5) indicate an effect of the net wage which is about 14 times as large as the effect of the welfare state variable. In addition, the standard error of the welfare state coefficient points to a statistical insignificance of the effect. Under the assumption that the findings in specification (4) most accurately describe the reality, the effect of the net wage is still three times as large as the effect of the social expenditure variable. In the case of the net replacement rate and the annual replacement income, the gap lies between those two extremes[23]. Secondly, restricting the freedom of movement almost completely offsets the migration incentives of the pull factors, but does not seem to counterbalance the effects from changing push factor variables in the source countries.

6 Conclusion

The EU enlargements in 2004 and 2007 initiated a debate about the future of the welfare states in the EU-15. According to Kvist (2004) and Sinn (2002), the logic of "welfare magnetism" might cause strategic behavior of national governments with respect to the generosity of the welfare state. Hence, policy makers were expected to reduce the level of social security to avoid their countries becoming attractive destinations for "welfare migrants". In addition, national governments were endowed with another strategic instrument for reducing the potential pressure from these migration incentives: the *2 + 3 + 2 rule* which allows the closing of borders for migrants from the new member states by temporarily restricting the freedom of movement for workers.

In this paper, the interaction of these two policy variables in the EU-15 after 2002 is analyzed. The first result is that the race to the bottom after the accession decision did not happen as predicted. OECD data on the development of the social expenditures relative to GDP and the net replacement rates in the destination countries after 2002 give no indication of a strong EU-15 wide reduction in spending on welfare. Secondly, in the analysis of determinants of migration flows to EU-15 countries from 2004 to 2011, evidence is found that the "welfare magnet" effect is rather weak or does not persist at all and presumably does not influence national decision making. The ratio of social expenditures to GDP as a measurement for the welfare state generosity does not seem to have a positive effect on the immigration flows to EU-15 countries. The expected payments in the case of unemployment measured by the net replacement rate and the net replacement income do also not act as "welfare magnets". In contrast, the application of the *2 + 3 + 2 rule* is found to have a strong impact on migration behavior. It completely

offsets, for example, the positive incentive effect of the net wage or a low unemployment rate in a destination country.

Thus, two reasons can be identified which explain the observation that the race to the bottom did not take place after 2002. First, the "welfare magnet" effect is just one determinant among a large number of other determinants of migration decisions and is probably of too little relevance to justify major welfare state reforms in the EU-15. Secondly, the application of restrictions on the freedom of movement for workers might have neutralized potential effects of the welfare state. Furthermore, evidence is found that the positive migration incentives from a larger remuneration of human capital are also offset in the case of restricted freedom of movement for workers.

Based on the results of this analysis, it thus seems unlikely that the end of the *2 + 3 + 2 period* for Bulgaria and Romania in January 2014 will initiate major reforms of national welfare state institutions in the EU-15 or even start a race to the bottom of welfare state standards. This prediction is supported by the experience in countries that already opened the labor market for workers from the EU-2. In Denmark, Finland, Greece, Ireland, Italy, Portugal and Sweden, no evidence for adjustments of the welfare state can be found after the realization of the freedom of movement for EU-2 workers.

Endnotes

[1]EU-10: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia.

[2]EU-15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

[3]EU-8: EU-10 without Cyprus and Malta.

[4]See Mayda (2010) and Zaiceva and Zimmermann (2008) for an overview.

[5]See Nannestad (2007) for a detailed discussion.

[6]Giulietti and Wahba (2012) describe the composition of social expenditures in OECD countries based on the SOCX database.

[7]For the year 2001, the estimations for the non-national population stock in Greece based on the EU-LFS is 45.38 percent of the number that is reported by the Greek census data. For Spain, the estimation from the EU-LFS is about 43.62 percent of the number reported by the Spanish population register in 2001.

[8]In the surveys before 2004, it is distinguished between EU-15 and non-EU-15 nationalities.

[9]For an overview of the factors, see Zaiceva and Zimmermann (2008).

[10]This is a standard approach in the literature. See, for example, Pedersen et al. (2008).

[11]See the Additional file 1.

[12]See Baas and Brücker (2010) for a discussion of the alternative approaches.

[13]See the Additional file 1.

[14]For a discussion of the climate as a pull factor, see Graves (1980).

[15]A detailed description of the variables included and their data sources can be found in the Additional file 1.

[16]See Pedersen et al. (2008) or Beine et al. (2011).

[17]See also Thompson (2011).

[18]The mean of the number of individual observations per cohort is 466.49, the standard deviation is 700.22. The smallest number of observations per cohort is 51, the largest is 5884.

[19]Unfortunately, I cannot distinguish between the source countries Cyprus and Malta that were not affected by the restrictions and the Eastern European member states (EU-8). However, since the population in Cyprus and Malta is relatively small, it is arguable that the effects of the transitional periods on the immigration flows from these countries can be neglected.

[20]6,140/10,000 × 4.508 = 2.768 (see column 4).

[21]6,140/10,000 × (4.508 − 3.479) = 0.632 (see column 5).

[22]See column 6 which presents the difference in the values of column 4 and column 5.

[23]I find that the effect of the net wage is about six times as large as the non-significant net replacement rate effect and three times as large as the non-significant replacement income effect. De Giorgi and Pellizzari (2009) report a net wage effect that is about 10 times as large as the "welfare magnet" effect of the replacement income. In contrast to my results, they find significant effects of this welfare measurement.

Additional file

Additional file 1: Alternative measurements of the generosity of the welfare states. Development of the average net replacement rates in the EU-15, 2002 - 2010 **Figure 1A**. Development of the public social expenditures per capita with constant prices (2000) and in PPP (2000) relative to the year 2004, 2004 – 2009 **Figure 2A**. Application of the 2+3+2 rule (year when the restriction was lifted) **Table 1A**. Number of migrants with an EU-10 nationality in the EU-15 countries (2004 - 2011) **Figure 3A**. Number of migrants with an EU-2 nationality in the EU-15 countries (2004 - 2011) **Figure 4A**. Number of migrants with an EU-15 nationality in the EU-15 countries (2004 - 2011) **Figure 5A**. Migrant stocks in the destination countries, grouped by age and source region (2010) **Table 2A**. Population in source regions, grouped by age and source region (2010, in millions) **Table 3A**. Number of non-nationals in EU-15 destination countries per 100 persons in the source **Table 4A**. Summary statistics of the country panel (minimum of 50 observations per cohort) **Table 5A**. Summary statistics of the country panel (minimum of 10 observations per cohort) **Table 6A**. Pooled OLS regression for the dynamic stock model (minimum of 50 obs. per cohort) **Table 7A**. Estimates for the static flow model with all covariates (min. of 50 obs. per cohort) **Table 8A**. Estimates for the static flow model with all covariates (min. of 10 obs. per cohort) **Table 9A**.

Competing interests
The IZA Journal of Migration is committed to the IZA Guiding Principles of Research Integrity. The author declares that he has observed these principles.

Acknowledgments
I thank David Danz, Juri Demuth, Frank Fossen, Johannes Geyer, Clemens Hetschko, Katharina Jenderny, Andreas Knabe, Simon Lüchinger, Ben Mihm, Kai-Uwe Müller, Dominic Quint, Pia Rattenhuber, Davud Rostam-Afschar, David Saha, Ronnie Schöb, Viktor Steiner, Natasha Volodina and the anonymous referee for very helpful comments. I am also indebted to the participants of the Annual Meeting of the Verein für Socialpolitik 2013 in Düsseldorf, the ESPE Annual Conference 2013 in Aarhus and the participants of the 9th Finanzwissenschaftlicher Workshop and the Seminar on Public Economics at the Freie Universität Berlin for their contributions and remarks. Furthermore, I am grateful for the financial support of the project: "Effects of the EU enlargement on the German low wage sector and the basic income support system" (SCHO 1270/1-1) by the Deutsche Forschungsgemeinschaft (DFG). The EU-LFS data are provided by Eurostat under the contract number LFS/2010/03. I also thank Georgios Tassoukis and the IZA Bonn as cooperating partner as well as Frank Espelage and Ingo Kuhnert (Eurostat) and Heike Wirth (Gesis Mannheim) for their support. Responsible Editor: Klaus F. Zimmermann.

Received: 7 April 2014 Accepted: 16 July 2014
Published online: 30 August 2014

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doi:10.1186/s40176-014-0015-6
Cite this article as: Skupnik: **EU enlargement and the race to the bottom of welfare states.** *IZA Journal of Migration* 2014 **3**:15.